

Review of Kansas City Plant Remaining Site Profile Issues

Advisory Board on Radiation and Worker Health

Naperville, IL

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Work Group Members

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Site Profile Activities to date

- ABRWH agreed dose reconstruction feasible, determination noticed in Federal Register on April 21, 2016.
- SEC process concluded November 19, 2015; remaining site profile issues combined with original TBD issues in final TBD Issues Matrix.
- NIOSH addressed these TBD issues in January 2017 revision of KCP site profile (ORAUT-TKBS-0031 Rev. 01).
- SC&A reviewed revision and found conformance with matrix actions and work group commitments made previously.
- Work group met on March 2, 2017 and closed all remaining issues.

SEC Issues transferred to Site Profile Matrix

- **SEC 2, Worker Location, Job Category, and Coworker Model.** Because of varied historic operations and a lack of specific worker job locations and job categories, application of coworker and a generalized TBD could result in incorrect dose assignments.
- **Resolution:** Revised TBD provides guidance for different categories of workers for depleted uranium, and for different categories of workers and time periods for other radionuclide intakes. Attachment B provides external coworker assignment guidelines.

SEC Issues transferred to Site Profile Matrix

- **SEC 3, Chronic vs. Acute Intakes**, Uranium coworker model may not be applicable to most workers.
- **Resolution:** When estimating intakes, dose reconstructors should assume exposures to uranium dust were chronic. A chronic exposure pattern best approximates the true exposure conditions for most workers with a potential for intakes. In addition, a chronic exposure pattern approximates a series of acute intakes, which makes it appropriate when there is no specific information for a given individual.
- **SEC 10, Non-penetrating Dose** – for some periods details of non-penetrating exposure (especially 1959-1962) are lacking.
- **Resolution:** Revised TBD addresses concerns with the use of recorded dose units.

NIOSH added the following operations and exposure bounding methods to the TBD

- **Natural Uranium Operations (1950-1955)** – applies Battelle TBD-6000 methodology as bounding for inhalation and ingestion intakes, with accompanying information and guidance for these operations.
- **Post Operations Period (1955-1959)** – uses maximum gross-alpha measured air sample (49 pCi/m³) to determine internal exposure at KCP after natural uranium operations ceased in 1955 until start of KCP urinalysis program in 1959.
- **Tritium Water Operations (1959-1975)** – Bounding scenario uses 400 ml bottle of tritiated water spilled over a work year and absorbed by a worker (6.66 mrem/year dose applied to all workers).

NIOSH added the following operations and exposure bounding methods to the TBD cont.

- **Magnesium Thorium Alloy Operations (1961-1963, 1970-1977)** - engineering control limit of 3×10^{-11} $\mu\text{Ci/mL}$ alpha applied as a constant distribution to estimate an exposure rate for identified Mg-Th workers. TBD-6000 applied to determine air concentrations for classes of workers that had less exposure potential or spent less time in the Mg-Th machining areas (e.g., Department 20 or the Model Shop) than the machine operators.
- **Post Operations Period (1972-1984)** - bounded using the maximum measured surface contamination survey data during DU and D&D operations and ORAUT-OTIB-0070.
- **Organically Bound Tritium Operations** (hi-lo switch plates, 1963-1968) – bounded using the 95th percentile contamination transferred to skin and absorbed; 1.77 mrem/year dose applied to all workers.

NIOSH added the following operations and exposure bounding methods to the TBD cont.

- **Decommissioning and decontamination (1984-1986)** – bounded assuming alpha inhalation rate of 6.76 pCi/day and an ingestion intake rate of 0.135 pCi/day, based on “the air sample control level of 1×10^{-12} μ Ci/mL, a breathing rate 1.2 m³/hr, and a period of 2,000 hr/yr.” (reflects Rockwell report indicating no personnel exposures occurred).
- **Rad Waste Handling** - for operations associated with routine rad waste handling, rad-area maintenance, housekeeping and decontamination, bounding doses assigned to all unmonitored personnel performing this work using DU coworker model (applying exposure category 2 (*i.e., workers with occasional exposure*)).

Remaining Findings from Nov. 2013 Site Profile review

- **SP1: AMAD** - activities at KCP involved handling substantial quantities of UO₂ powder. Site profile recommended using default option AMAD of 5 μm, which was questioned by SC&A. Revised TBD includes additional guidance with detailed specifications for uranium oxide during operational period in question, satisfying original concern.
- **SP3: Bioassay Data** – bioassay data appeared to be incomplete. Resolved by revised coworker data and validation and verification performed.
- **SP5: Admin Codes** – approach used to categorize workers may result in misassignment of dose. Job titles and categories are now included in revised TBD to facilitate assignment.

Remaining Findings from Nov. 2013 Site Profile review cont.

- **SP13: Mg-Th Alloy operations** – Inhalation and ingestion intake rates by job category and time periods questioned. Revised TBD now provides information on this issue, and inhalation and ingestion intake rates by job category and time periods.
- **SP20: Photon Calibration** – correction factor for exposures to photon radiation, especially exposure to skin and shallow organs, was found to be needed. Revised TBD provides coworker shallow dose parameters, and recommends use of complete list of dose conversion factors in OCAS-IG-001, Revision 3, *External Dose Reconstruction Implementation Guideline*, instead of abbreviated list in previous TBD.

NIOSH will carry one commitment forward

- The TBD indicates no Mg-Th operations at KCP from 1963-1970. The Work Group remains concerned that while there is no evidence of continued Mg-Th operations, there is also no clear operational documentation regarding the cessation of those operations for that period of time. Therefore, NIOSH agrees to carry a commitment forward for *“the period from 1963-1970 [which will] remain an issue for continued follow-up to ensure operations were in fact suspended.”*